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## **Acknowledgment . . .**

We wish to thank the Equipment Manufacturer's Institute,  
for kindly allowing us to use some of their rough terrain graphics in the  
rough terrain section of this book.

# Foreword

An industrial truck operator's job is very important. It is a position of responsibility, the same as when you are driving your car on the road. There are rules and responsibilities you must obey and accept.

A “powered industrial truck” means a mobile, power driven vehicle used to carry, push, pull, lift, stack, or tier material.

A “rough terrain forklift truck” means a wheeled-type truck which is designed primarily as a fork truck that has a vertical mast or pivoted boom or both, which has variable fixed length reach and which may be equipped with attachments and is intended for operation on unimproved natural terrain as well as the disturbed terrain of construction sites.

This manual is divided into two parts. Part I provides an overview of safety rules and safe work practices for powered industrial trucks. Part II provides safety information specific to rough terrain forklift trucks.

For specific rules and regulations regarding your responsibilities when driving a powered industrial truck in Michigan, see MIOSHA\* General Industry Safety Standard Part 21- Powered Industrial Trucks, Construction Safety Standard Part 12 - Scaffolds and Scaffold Platforms, Construction Safety Standard Part 13 - Mobile Equipment.

It is important that you read and understand this manual. Periodic review is suggested to maintain your operating proficiency.



# Part I Powered Industrial Trucks



## Permits . . .

You must be trained and tested before you can operate a powered industrial truck. Upon passing this test, and meeting other operator requirements a permit will be issued to you. It should be carried by you or be available upon request.



## Personal Protective Equipment . . .

When your employer conducts a personal protective equipment hazard assessment (as required in Part 33, Personal Protective Equipment), they should include powered industrial trucks in their review.

You should wear approved work shoes.  
Safety shoes are **strongly recommended**.

Approved eye protection shall be worn at all times.

Head protection shall be worn where high-stacking operations are involved.



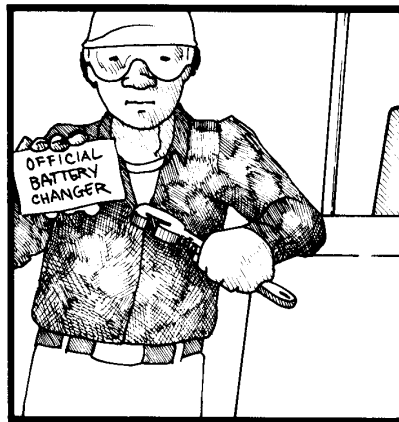
Additional personal protective equipment may be required in a battery charging/charging operation:

- ◆ common splash goggles or face shield
- ◆ gloves
- ◆ apron
- ◆ foot protection
- ◆ hard hats
- ◆ eye wash facilities

Only authorized employee(s) must change or charge a battery. This should be done only in a designated battery charging area.

No smoking or sources of ignition near battery or in battery charging area.

When operating a powered industrial truck in a hazardous area, only a truck specifically equipped for such operation shall be used.



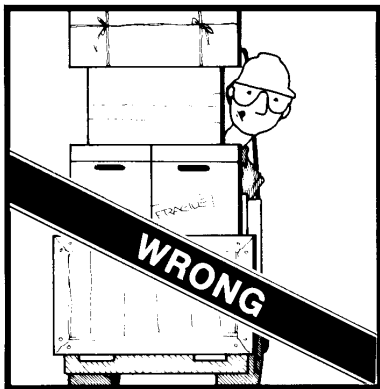


## Safe Operations . . .

No eating, drinking, or smoking while driving.

Maintain control of vehicle at all times.

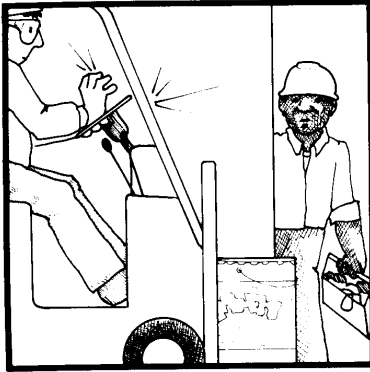
No horseplay or stunt driving.



You must give right-of-way to emergency vehicles.

Keep a clear view of the direction of travel (staying within the running lines of the vehicle). If the load blocks your view, drive with the load trailing.

Operate in designated powered industrial truck routes.  
Keep aisles clear.



Pedestrians have right-of-way.

Courteously sound horn or other type of audible device as a warning.

Do not approach persons standing in front of bench or fixed object.

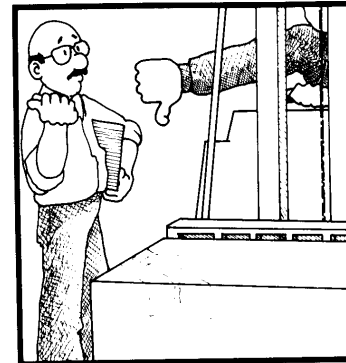
You should never allow any person to stand under or pass under an elevated load.

Do not overload truck.

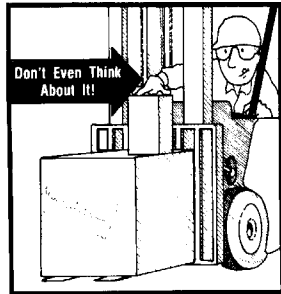
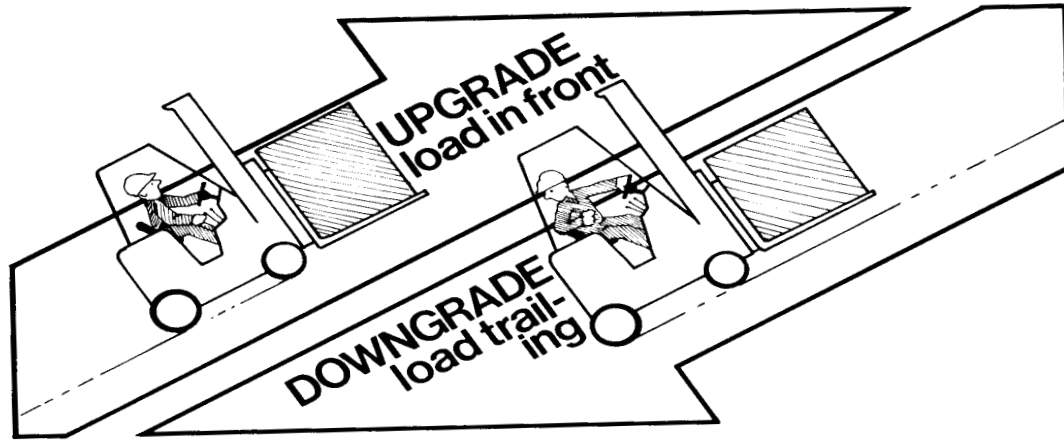
No riders, unless the powered industrial truck is designed with a passenger seat.

Use the brakes and come to a complete stop:

- ◆ At blind corners.
- ◆ At workplace entrances used by other traffic.
- ◆ Before reversing direction of travel.
- ◆ At designated stop signs.
- ◆ Before entering main aisles or roadways.



Always travel at the slowest speed on ramps.



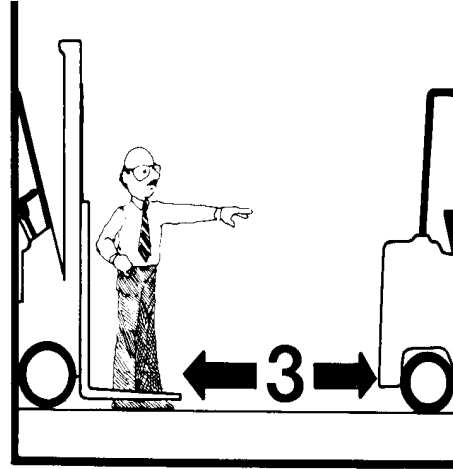
No arms or legs between uprights of mast or outside the running lines of powered industrial truck.

Never use your powered industrial truck for bulldozing, opening doors, pushing objects or towing vehicles. Do not use tips of forks to push or rearrange stock. Use your truck for its intended purpose.

## Know the Rules of the Road . . .

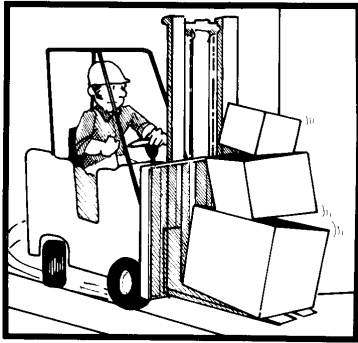
Keep three (3) truck lengths behind the truck you are following.

Obey all traffic signs.



Never pass another vehicle traveling in the same direction at: intersections, blind spots, or other dangerous areas.

Place forks under the load as far as possible to load. Tilt the mast back to cradle the load.



You must maintain control over the vehicle at all times. Allow for safe emergency stops. Start, stop, and turn in a way which will prevent a load from shifting or overturning.

Keep the forks in the lowest position from the floor when vehicle is moving.

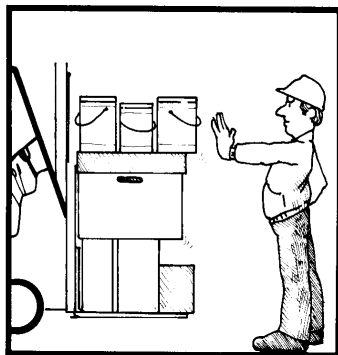
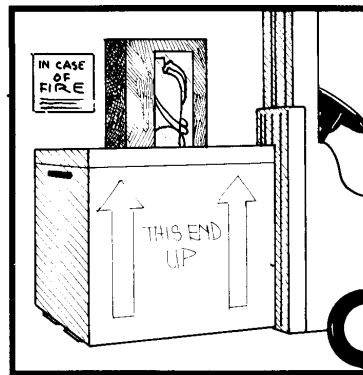
Remove loose objects from floors. Don't drive over or around them.

Tilt elevated load forward only when directly over unloading area, with load as low as possible. Use special care when placing loads near heaters, electrical connections, pipes, etc.

Be careful of the rear end of the truck swinging around when turning.

Be careful near edge of loading docks.

Park powered industrial truck in authorized areas only.



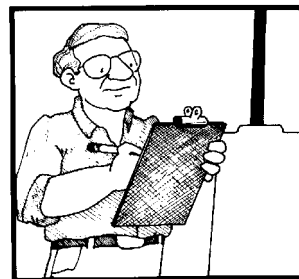
Always observe the floor load limits and overhead clearance.

An overhead guard on a powered industrial truck is required if you are stacking materials above your head.

Look around before moving. Start, turn and brake smoothly. Lift load carefully and smoothly.

## Checkout Procedures . . .

Perform daily check of your powered industrial truck at the start of each shift. It is recommended that a written record of vehicle repair be kept.



## What to check for and report . . .

**Each shift, prior to starting your powered industrial truck, check the following:**

- |  |  |   |   |
|--|--|---|---|
| <input checked="" type="checkbox"/> Brakes | <input checked="" type="checkbox"/> Steering   | <input checked="" type="checkbox"/> Oil level                 | <input checked="" type="checkbox"/> Water level         |
| <input checked="" type="checkbox"/> Tires  | <input checked="" type="checkbox"/> Hydraulics | <input checked="" type="checkbox"/> Fuel level/battery charge | <input checked="" type="checkbox"/> Instrument controls |

**Then after starting your truck check:**

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Warning lights               | <input checked="" type="checkbox"/> Brakes — both service and parking |
| <input checked="" type="checkbox"/> Gauges                       | <input checked="" type="checkbox"/> Hydraulic control operations      |
| <input checked="" type="checkbox"/> Horn                         | <input checked="" type="checkbox"/> Lift & tilt operations            |
| <input checked="" type="checkbox"/> Headlights for night driving | <input checked="" type="checkbox"/> Load engaging means               |

# Unsafe to drive . . .

Your truck is unsafe to drive if:

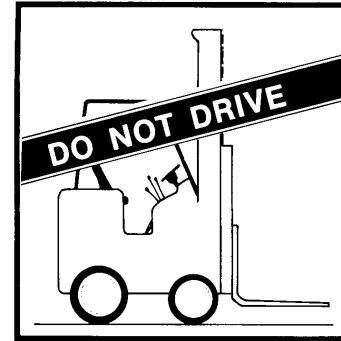
Service/parking brakes do not perform.

Fuel system leaks.

Excessive lift, drift, or tilt of cylinders or forks.

Excessive free play in steering.

Excessive hydraulic leaks.



If mechanical failure occurs on the job, contact your supervisor – He/She will decide if the truck should be driven to repair or towed.

Repairs or adjustments are to be made by authorized personnel only.



## Refueling . . .

- ◆ **No smoking or any other source of ignition (within 25 feet) when refueling.**
- ◆ **Replace fuel cap before restarting**

In case of a fuel leak in gasoline or diesel trucks, stop *immediately*, shut off ignition, and contact supervisor/plant security.

Do not attempt to make any repairs or adjustments yourself.



# If you leave your truck unattended . . .

- ◆ Forks flat to floor or ground
- ◆ Controls neutralized
- ◆ Brakes set
- ◆ Power off
- ◆ If on incline -- wheels blocked, steering wheel turned

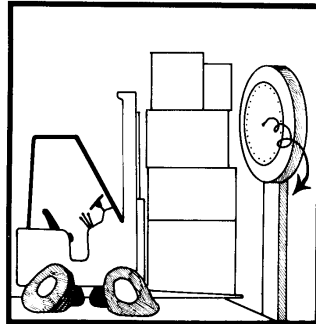
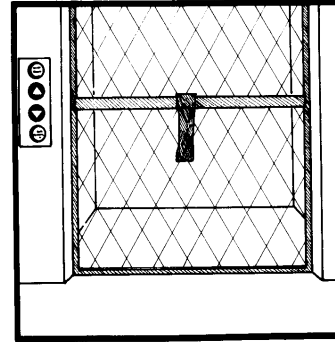
# Elevator Safety . . .

When approaching the elevator, stop six (6) to ten (10) feet from door.

Get down from your truck to summon the elevator.

Be sure floors are level before entering.

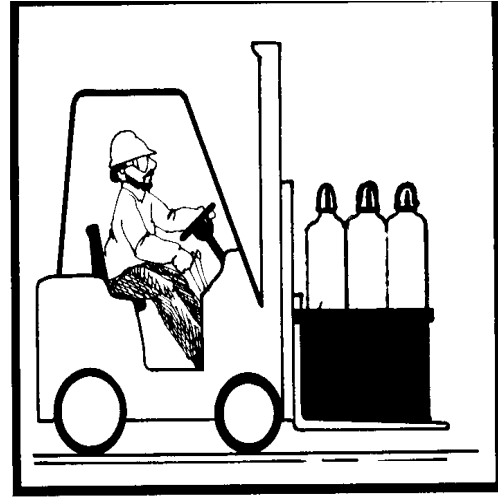
Enter squarely, set brake, shut off power before you start the elevator.



Know the capacity of your truck and the weight of the load you are hauling. Do not exceed the rated capacity. Also be sure the flooring of the route you are traveling will support the weight.

Never attempt to make repairs or adjustments to elevators – report them to your supervisor.

## Special Racks . . .



Carry all parts of materials in approved containers only.

Barrels and drums in special racks.

Oxygen, acetylene and other gas cylinders – upright-fastened-safety caps tight and in approved racks.

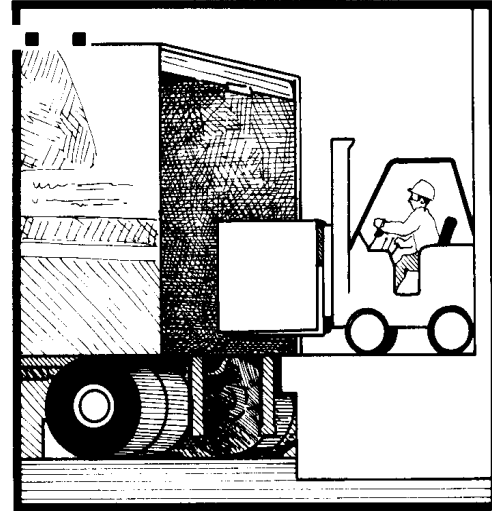
# Loading - Unloading . . .

## Highway Trucks –

Before entering trucks and trailers, check the condition of flooring for weaknesses/breaks.

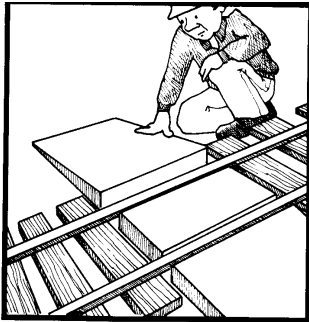
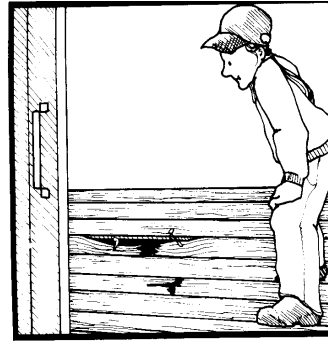
When being boarded by a powered industrial truck, a highway truck and trailer must have their brakes set and not less than 2 wheels blocked or restrained by mechanical means.

Visually inspect landing gear of semitrailers.



## Railway Cars –

Check flooring for breaks/weaknesses. Be sure wheel stops, hand brakes, and other positive protection is in place to prevent motion of railcar during loading and unloading.



Portable runways and plates between docks and trucks or railroad cars should be checked for capacity and be properly secured before crossing.

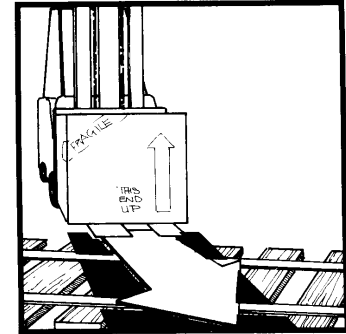
Only authorized and trained personnel should open and enter a rail car.

Cross tracks diagonally, and never park closer than 8 ½ feet from center of track.

Never open or close freight car doors with your truck, unless it is designed and/or specially equipped to do so.

Never tow or push railcars or other vehicles, unless your truck is designed for that purpose.

Derailler, bumper blocks and clearance signs -



Where rolling railroad cars on a spur track could make contact with a rail car being loaded or unloaded, repaired or serviced, or enters a building, work or traffic area, derailleurs, bumper blocks, a blue flag or blue light, or other equivalent protection shall be used.

A visible “Close Clearance” sign shall be used to indicate close clearance between rail car and an adjacent fixed object if the fixed object is located less than 3 1/2 feet from the center of a straight track and 9 feet from the center of a curved track.

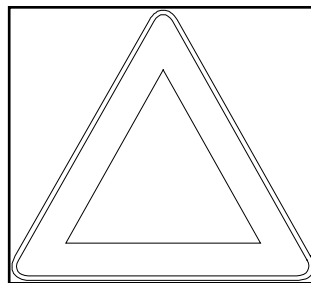
# Slow Moving Vehicles . . .

## Just A Reminder When Operating On Public Roads

Operate your powered industrial truck in accordance with local traffic rules when on a public road.

### Part 37 Accident Prevention Signs and Tags

Emblem for slow-moving vehicles:



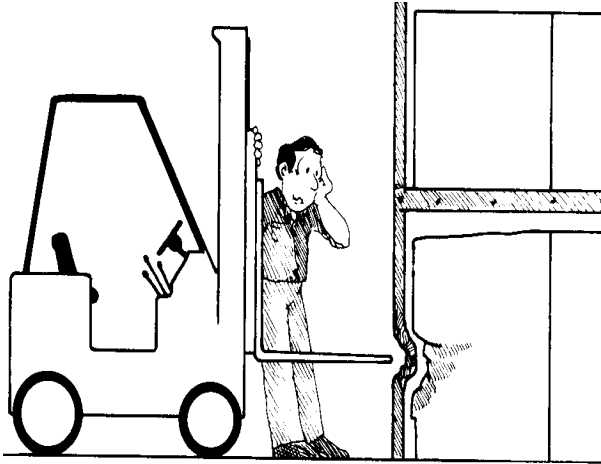
(1) An emblem shall be used on the rear of a vehicle used on a public road which, by design, moves at 25 miles per hour or less outside a building. Such an emblem shall not be used as a clearance marker for wide machinery or as a replacement for required lighting.

(2) This emblem shall consist of a fluorescent yellow-orange triangle with a dark red reflective border. It shall be entirely visible in daylight and at night from all distances between 600 and 100 feet from the rear when directly in front of the lawful upper beam of the headlamps.

(3) The emblem shall be mounted, point up, in a plane perpendicular to the direction of travel, plus or minus 10 degrees. It shall be placed centrally at the rear of the vehicle, unobscured, and 2 to 5 feet above the ground measured from the lower edge of the emblem. It shall be securely attached to the vehicle.



## If an accident happens



Report all accidents and near misses: including personal injury, damage to machine, building, or materials. An operator that has been observed to operate the vehicle in an unsafe manner or if the operator has been involved in an accident or near-miss incident, refresher training in relevant topics shall be provided.

# Protect Your Health . . .

## Early Symptoms of PIT Carbon Monoxide Exposure

- ◆ Headache
- ◆ Dizziness
- ◆ Weakness
- ◆ Nausea
- ◆ Visual Disturbance
- ◆ Confusion
- ◆ Symptoms may not develop until the Carbon Monoxide concentration exceeds the permissible exposure limits



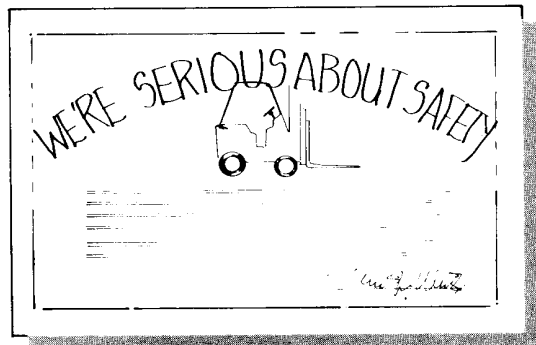
## PIT Engineering Controls - Combustion-Powered

- ◆ Elimination: electric lift trucks
- ◆ Substitution: propane for gas or diesel
- ◆ Ventilation: general dilution
- ◆ Other controls
  - oxygen sensor
  - catalytic converter
  - engine maintenance



## We're serious about safety . . .

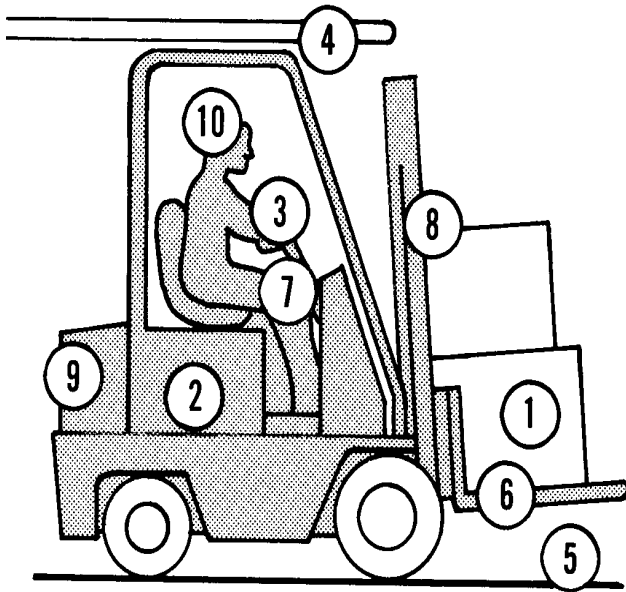
Any supervisor or manager has the authority to stop any person driving without authorization or in an unsafe manner.



This booklet is presented to you as part of your powered industrial truck training program.

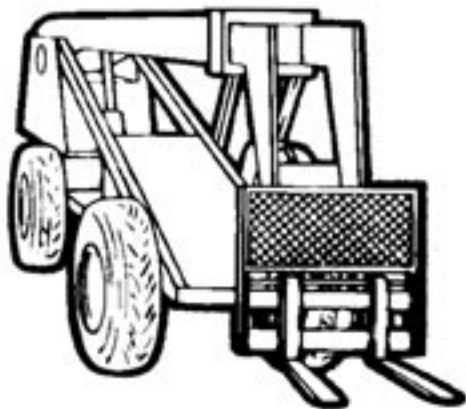
Keep it close at hand and review it periodically. It will help you become a skilled, safe, operator.

## IN REVIEW ...



1. Know load limits.
2. Conduct daily maintenance checks.
3. Sound a warning.
4. Be aware of clearance heights.
5. Know surface conditions.
6. Forks close to floor.
7. Body within running lines of truck.
8. Forks tilted back when loaded.
9. Only authorized personnel to charge or change battery
10. THINK AND ACT SAFELY.





## Part II

# Rough Terrain Forklift Trucks



In addition to the preceding operating requirements —  
The following guidelines apply to operators of rough terrain forklift trucks.

Information obtained from the ASME B56.6-1992  
(Revision of ASME/AMSI B56.6-1987)

*Rough Terrain graphics courtesy of Equipment Manufacturer's Institute*





# Stability . . .

Rough terrain forklift trucks which comply with the stability requirements are stable when properly operated. Improper operation, faulty maintenance, or poor housekeeping may contribute to a condition of instability.

Other conditions which may affect stability are:

- ▼ ground and floor conditions
- ▼ speed
- ▼ dynamic and static forces
- ▼ counterweight location
- ▼ the judgement exercised by the operator
- ▼ grade
- ▼ loading
- ▼ wheelbase
- ▼ improper tire inflation

Rough terrain forklift trucks equipped with attachments must be operated as a partially loaded truck even when there is not a load on the attachment.

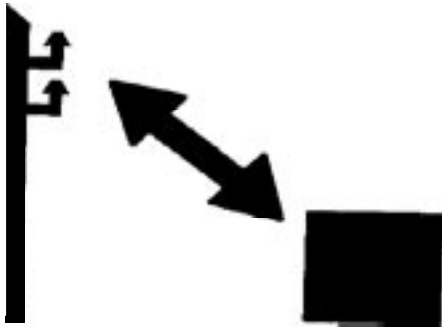
The amount of forward and rearward tilt to be used is governed by the application. The use of maximum rearward tilt is allowable under certain conditions, such as traveling with the load lowered. The stability of a rough terrain forklift truck does not encompass consideration for excessive tilt at high elevations or the operations of trucks with excessive off-center loads.



# Operator Responsibility . . .

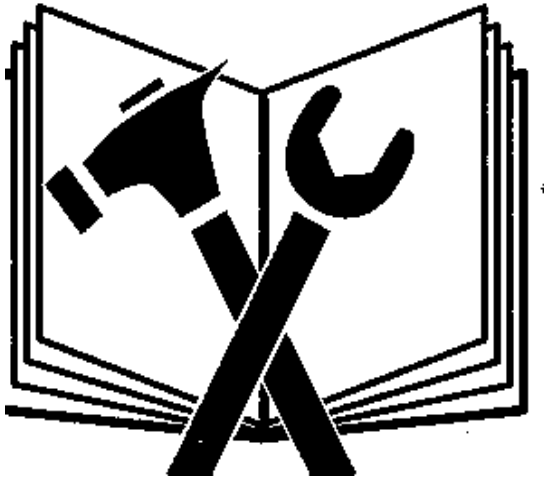
You must be familiar with the operation and function of all controls and instruments before operating a rough terrain forklift truck.

Before operating the truck, read and be familiar with the operator's manual for the particular truck being operated.



Check for adequate clearance before driving under electrical lines, bridges, etc.

## General . . .



Before starting to operate a rough terrain forklift truck:

- ◆ Be in operating position and fasten seat belt.
- ◆ Place directional controls in neutral.
- ◆ Disengage clutch on manual transmission-equipped rough terrain forklift trucks, or apply brake on power shift or automatic transmission-equipped trucks.
- ◆ Start engine.

Do not start or operate the rough terrain forklift truck, any of its functions, or attachments from any place other than the designated operator's position.

## Traveling . . .

When rough terrain forklift trucks are equipped with individual wheel brake pedals, lock pedal together for simultaneous operation before travel on public roads or when changing job sites.

For rough terrain forklift trucks equipped with a differential lock, the lock should not be engaged when driving on the road or at high speeds or when turning. If the lock is engaged when turning, there could be loss of steering control.



## Loading . . .

Improper use of stabilizer controls (if so equipped) could cause rough terrain forklift truck upset. Use stabilizers only in compliance with the manufacturer's instructions.



For rough terrain forklift trucks equipped with lateral leveling:

- ◆ Level the frame before raising the boom or mast, with or without a load.
- ◆ Lateral leveling should not be used to position an elevated load – lower the load and reposition the rough terrain forklift truck.

Handle only stable or safely arranged loads:

- ◆ When handling off-center loads which cannot be centered, operate with extra caution
- ◆ Handle only loads within the capacity of the rough terrain forklift truck
- ◆ Handle loads exceeding the dimensions used to establish rough terrain forklift truck capacity with extra caution. Stability and maneuverability may be adversely affected.

## Suspended Loads . . .

The handling of suspended loads by means of a crane (boom) or other device can introduce dynamic forces affecting the stability of a rough terrain forklift truck that are not considered in the stability criteria. Grades and sudden starts, stops, and turns can cause the load to swing and create a hazard if not externally stabilized.

When handling suspended loads:

- ◆ Do not exceed the truck manufacturer's capacity of the rough terrain forklift truck as equipped for handling suspended loads.
- ◆ Only lift the load vertically and never drag it horizontally.
- ◆ Transport the load with the bottom of the load and the mast as low as possible.
- ◆ With load elevated, maneuver the rough terrain forklift truck slowly and cautiously, and only to the extent necessary to permit lowering to the transport position.
- ◆ Use tag lines to restrain load swing when ever possible.

## Elevating Personnel . . .

A rough terrain forklift truck should not be used to lift people unless there is no other practical option. If a rough terrain forklift truck must be used to lift people, the following precautions must be taken:

- ◆ Provide a personnel platform which complies with the design requirements listed in the appropriate standard.
- ◆ Securely attach the platform to the lifting carriage or forks.
- ◆ Secure the lifting carriage and forks to prevent them from pivoting upward.
- ◆ Deactivate the rotation on trucks equipped with rotation.
- ◆ When moving parts of the rough terrain forklift truck pose a hazard to elevated personnel, provide appropriate protection.
- ◆ Provide protection for personnel (in their normal working position on the platform) from moving parts of the rough terrain forklift truck that presents a hazard.
- ◆ Provide overhead protection as needed by the operating conditions.

- ◆ Lifting mechanisms need to operate smoothly through the entire lift range – while loaded or unloaded. All lift limiting devices and latches, if provided, need to be working properly.
- ◆ Be certain that the mast or boom travel is vertical –do not operate on a side slope unless the rough terrain forklift truck is leveled.
- ◆ Keep the platform horizontal. Never tilt platform forward or rearward when it is elevated.
- ◆ Be certain that the forklift truck has a firm footing.
- ◆ Be certain that required restraining means such as railing, chains, cable, body belt(s) with lanyard(s) etc., are in place and properly used.
- ◆ Place rough terrain forklift truck control(s) in neutral and set parking brake.
- ◆ Before elevating personnel, area should be marked to warn of work by elevated personnel.
- ◆ Maintain a path of platform travel that is clear of hazards, e.g., storage racks, scaffolds, overhead obstructions, and electrical wires.



- ◆ Keep hands and feet clear of controls other than those in use.
- ◆ Always lower the platform, if you must move the forklift truck for adjustments in positioning.
- ◆ Alert elevated personnel before moving the platform. Then move the platform smoothly and with caution.
- ◆ A trained operator shall be in position to control the forklift truck or available to operate controls if the platform is not equipped with controls. *The operator shall remain at the operator station if an employee is elevated.*
- ◆ The combined mass (weight) of the platform, load, and personnel shall not exceed one-third of the capacity at the rated load center position as indicated on the information plate(s) of the forklift truck on which the platform is used.
- ◆ Personnel are to maintain firm footing on the platform. Use of railing, planks, ladders, etc., on the platform for purpose of achieving additional reach or height is prohibited.
- ◆ Be certain that personnel and equipment on the platform do not exceed the available space.
- ◆ Platform shall be lowered to floor level for personnel to enter and exit. Personnel shall not climb on any part of the rough terrain forklift truck in attempting to enter and exit.

- ◆ Any body belt, lanyard, or deceleration device which has sustained permanent deformation or is otherwise damaged shall be replaced.
- ◆ Prohibit modification to the platform that is detrimental to its safe use.



# advisory

## **Standard Update Powered Industrial Truck - Part 21**

Accidents, injuries and fatalities due to inadequate maintenance and/or lack of comprehensive operator training in the use of powered industrial trucks has been, and continues to be, a major concern in Michigan, as well as in the rest of the nation. According to OSHA, an estimated 100 fatalities and 95,000 injuries annually are caused by the unsafe operation of powered industrial trucks.

Federal OSHA's reaction to this situation resulted in amendments to their Powered Industrial Truck Standard, effective in December 1999, requiring operator training, evaluation and certification. Michigan has had training and permit requirements since 1971 in Part 21, Powered Industrial Truck Safety Standard. Some of the new federal OSHA requirements were not contained in Part 21, however, they were addressed by other MIOSHA standards.

In order to make it easier for employers to identify these existing requirements, Michigan's Part 21, Powered Industrial Truck Safety Standard was amended and took effect April 28, 2000. Current rules require that employers ensure that only trained and authorized operators shall be permitted to operate a powered industrial truck. This advisory summarizes the revisions to Part 21.

The standard states that “an individual who is authorized by the employer and who has the knowledge, training, and experience to train and evaluate the competence of the operator shall provide the training and evaluation.”

Training shall consist of a combination of both classroom and hands-on training. The formal instruction can include lecture, discussion, interactive computer learning, videotape, and written material. The hands-on or practical training should include demonstrations performed by the trainer and practical exercises performed by the trainee. Following the training, the operator’s performance in the workplace will be tested and evaluated, and a operator’s permit will be issued.

Powered industrial truck operators are to be re-evaluated at least every three years, and refresher training is recommended. Refresher training should also help to ensure that the employee has maintained the ability and knowledge to operate the truck in a safe manner. Refresher training in relevant topics shall also be provided to an operator when:

- They have been observed operating the vehicle in an unsafe manner.
- They have been involved in an accident or a near-miss incident.
- They have received an evaluation that reveals they are not operating the truck safely.
- They are assigned a different type of truck, or the truck has been modified.
- Conditions change in the workplace that could affect safe operation of the truck.

The following vehicles were added to the definitions contained in Part 21:

- **High-lift Platform Truck:** a self-loading truck equipped with a load platform, intended primarily for transporting and tiering loaded skid platforms.
- **Industrial Crane Truck:** a truck intended primarily for pick and carry use in warehousing, yarding, or industrial plant operation over improved or hard-surfaced roads and yards, including maintenance within these areas.
- **Rough Terrain Forklift Truck:** a wheeled-type truck which is designed primarily as a fork truck that has a vertical mast or pivoted boom, or both, which has variable fixed length reach and which may be equipped with attachments and is intended for operation on unimproved natural terrain, as well as the disturbed terrain of construction sites.

The training requirements not specifically addressed in Part 21, but required in other MIOSHA standards, were referenced in the amendment, to clarify the training responsibilities. Training associated with the hazards of exhaust gases and electrolyte chemicals used for battery operated trucks shall be provided in accordance with the Michigan Right-to-Know Hazard Communication Standard, Occupational Health Air Contaminants Rule, and Part 33, Personal Protective Equipment Standard.

Several other changes were also made. When being boarded by a powered industrial truck, a highway truck and trailer shall have their brakes set, and not less than two wheels blocked or restrained by other mechanical means installed in a manner that will hold the trailer from movement. (Note: the reference to “rear wheels” was eliminated.)

Provisions shall be made to isolate rail cars during switching operations as required by GI Part 1, General Provisions, R 408.10026. Where rolling railroad cars on a spur track could make contact with a rail car being loaded or unloaded, repaired or serviced, or entering a building, work or traffic area—derailers, bumper blocks, a blue flag or blue light, or other equivalent protection shall be used.

And finally, where there is potential for employee exposure to injurious corrosive electrolyte solutions (e.g. sulfuric acid) associated with battery-powered industrial trucks, the employer shall provide: personal protective equipment in accordance with OH Part 433 and GI Part 33. The employer must also provide: suitable facilities for quick drenching or flushing of eyes and body within the work area for immediate emergency use in accordance with OH Part 440, Medical Services and First Aid.

Employers are encouraged to review and enhance their current training programs for powered industrial truck operators. A higher level of training helps employees recognize a hazardous situation before it becomes an incident.

A sample operator permit, along with a revised operator manual with additional guidelines for operators of Rough Terrain Forklift Trucks have been developed and are available from the CET Publication Library. The sample permit is not an “official” permit, but an example that may be used, copied or modified by employers, as long as it has the required information. Copies of the Amended Part 21, Powered Industrial Truck Safety Standard are available from the **MIOSHA Standards Section at (517) 322-1845**, or at the bureau’s website: [www.michigan.gov/miosha](http://www.michigan.gov/miosha).











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